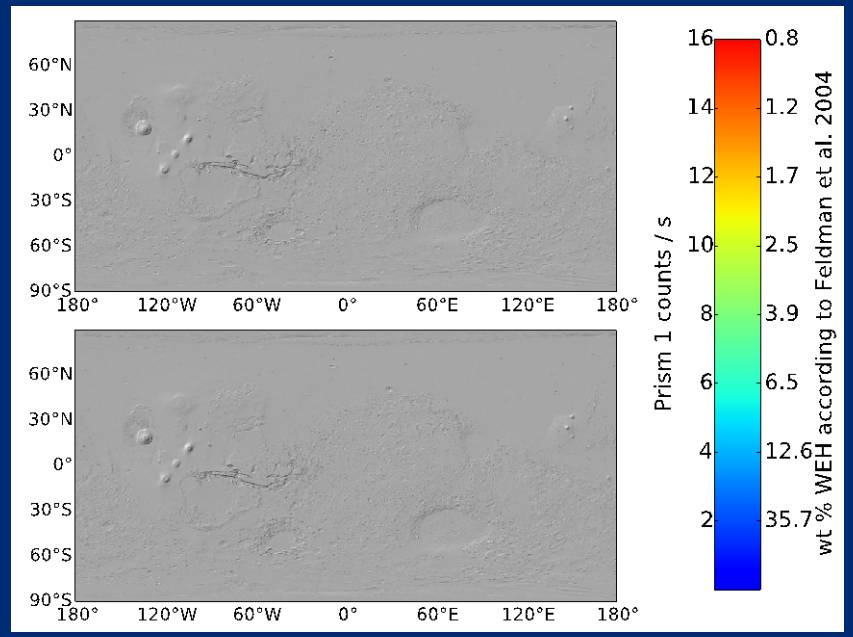
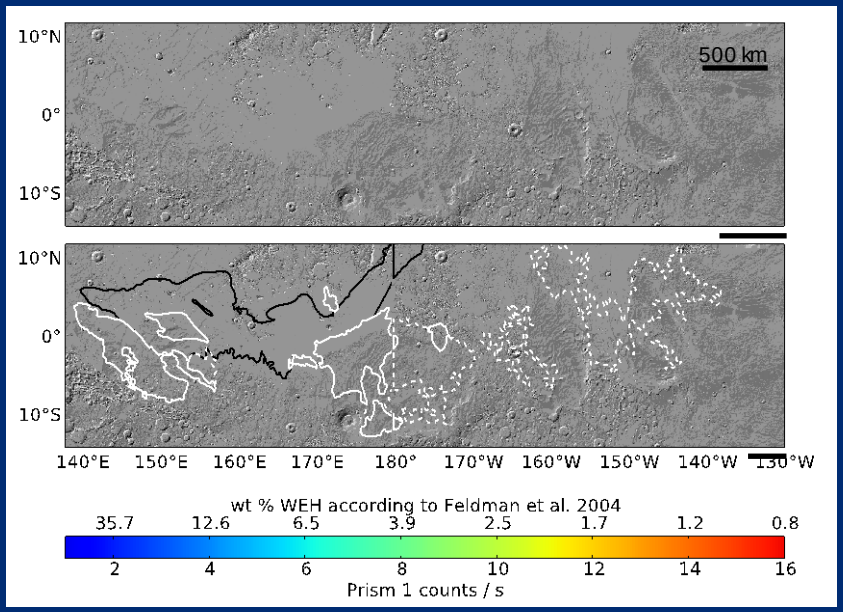
A Fresh Look at Older Mars Odyssey Neutron Spectrometer Data Yields a Surprise at the Equator

Image-reconstruction has improved the spatial resolution of Mars Odyssey Neutron Spectrometer (MONS) data, which show where H exists near the surface, by a factor of 2 (*left-hand figure*).

This improvement revealed H enhancements, potentially in the form of water, that were previously too small to be seen. The Medusae Fossae Formation (MFF), where radar-sounding has suggested the presence of low-density volcanic deposits or water ice, was found to be the most H-rich equatorial region. If the detected H were in the form of water then it would constitute over 35 % of the mass of parts of the deposit (Water Equivalent Hydrogen, WEH, *right-hand figure*), consistent with the presence of excess, pore-filling ice.





Figures: MONS epithermal data before (above) and after (below) reconstruction. In the above figure, the white contours show the lobes of the MFF and the black contour outlines a lava flow. The black bars in the bottom right of the panels show the resolutions of the two data sets.

However, at the equator ice is not stable at any depth. Thus the deposit's continued presence, perhaps as hydrated minerals, is surprising.

An improved-resolution map of the MONS epithermal neutron data was created and reveals substantial, unexpected H deposits near the equator.

J. Wilson et al. (2018) Icarus. doi.org/10.1016/j.icarus.2017.07.028